

Application No. 10/710,884
Amendment dated November 25, 2005
Reply to Office Action of September 2, 2005

Docket No.: 22040-00034-US1

REMARKS

Claims 1-9 are now pending in this application. Claims 1, 4, and 6 are independent. No claims have been amended or canceled, and claims 5-9 have been added by this amendment. There is no new matter involved with any new claim.

Anticipation Rejection Over Matsushita

Withdrawal of the rejection of claims 1 and 4 under 35 U.S.C. 102(b) as being anticipated by Matsushita (JP 05-069182 A) is requested.

Applicant notes that anticipation requires the disclosure, in a prior art reference, of each and every limitation as set forth in the claims.¹ There must be no difference between the claimed invention and reference disclosure for an anticipation rejection under 35 U.S.C. §102.² To properly anticipate a claim, the reference must teach every element of the claim.³ "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference".⁴ "The identical invention must be shown in as complete detail as is contained in the ...claim."⁵ In determining anticipation, no claim limitation may be ignored.⁶

The Examiner asserts that Matsushita discloses a process of printing a cream solder on a circuit substrate with a metal terminal formed on the back surface, and a process of performing solder joining using a laser beam.

Applicants submit that Matsushita is identical to what is mentioned as conventional or background art in the present specification, and that Matsushita does not represent Applicants' disclosed or claimed invention.

¹ *Titanium Metals Corp. v. Banner*, 227 USPQ 773 (Fed. Cir. 1985).

² *Scripps Clinic and Research Foundation v. Genentech, Inc.*, 18 USPQ2d 1001 (Fed. Cir. 1991).

³ See MPEP § 2131.

⁴ *Verdegal Bros. v. Union Oil Co. of Calif.*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

⁵ *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

⁶ *Pac-Tex, Inc. v. Amerace Corp.*, 14 USPQ2d 187 (Fed. Cir. 1990).

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Applicants' disclosed and claimed invention involves a semiconductor part with a metal terminal formed on not only on the back surface, but also on the side surface of the semiconductor part, and also that the side surface is used as a target of solder joining by irradiating the side portion of the metal terminal with a laser beam on.

In contrast, Matsushita discloses a process of solder jointing by irradiating laser beam on the surface 7 of electrode 6, and also discloses black coating 4 (flux which is mixed with a black substance, e.g., graphite) that is chosen to be black for heat absorption reasons. Even if electrode (lead) 6 is equivalent to the metal terminal as claimed, it only comprises laser beam irradiation on a metal terminal, and does not comprise laser beam irradiation on the *side* surface of the metal terminal as is claimed in independent claim 1.

By way of further distinction over the applied art, the significance of irradiating a laser beam only on the side surface is discussed below.

The applied art discloses the process of solder jointing a lead that is sticking out from the semiconductor part. The disclosed and claimed invention is a process of solder joining a component that has no lead sticking out from the semiconductor part; instead, the electrode is layered on both the back surface and the side surface of the component body.

The electrode of the targeted component is present on both the back surface and the side surface, and to make an effective solder joint, it is necessary to solder (*i.e.*, "wet the solder") on both the back surface and the side surface.

The laser beam irradiated on the side surface heats the component body and melts the solder on the back surface through thermal conduction, which makes it possible to solder the electrode on the back surface.

The side is solder jointed by inducing ("sucking up") the melted solder on the back surface. In order to do this, it is necessary to bring the temperature of the side surface above the melting point of the solder. By irradiating the side surface, the electrode on the side surface is heated to high temperature, which makes it less difficult to draw up the solder to joint the side

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surface. Thus, irradiating laser beam on the side surface enables soldering both the back surface and the side surface simultaneously and with ease. This is a significant factor involved with irradiating the side surface.

In addition, cream solder can only be provided on the substrate side (the back surface), and the back surface can be soldered by thermal conduction. However, since the side surface is not provided with solder, it must be soldered by inducing (sucking up) the solder, melted on the back surface, and induced up the side surface.

Specifically, the applied art does not disclose a method of soldering a semiconductor part, which includes, among other features, "...mounting a semiconductor part in which a metal terminal is formed on a back surface and a side surface on said cream solder so that only a back surface portion of said metal terminal is in contact with said cream solder; and performing solder joining of said land and said semiconductor part by irradiating a side surface portion of said metal terminal with laser beams", as recited in independent claim 1.

In addition, the applied art does not disclose a mounted structure of a semiconductor part, wherein, among other features, "...on a land of a circuit substrate, a semiconductor part having a metal terminal on a back surface and a side surface is mounted, via a cream solder printed on said land, so that almost all area of said land is opposed to a mounting surface of said semiconductor part and said land and said semiconductor part are solder jointed..., as recited in independent claim 4.

Accordingly, since the applied art does not disclose all the claimed features of independent claims 1 and 4, reconsideration and allowance of claims 1-4 are respectfully requested.

Anticipation Rejection Over Takanashi et al.

Withdrawal of of the rejection of claims 1-4 under 35 U.S.C. 102(b) as being anticipated by Takanashi et al. (US 5842627) is requested. The legal requirements for anticipation have been set forth above.

The Examiner asserts that Takanashi et al. disclose a process of printing a cream solder on a circuit substrate with a metal terminal formed on the back surface, and a process of

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performing solder joining using a laser beam. The Examiner further asserts that Takanashi et al. disclose supplying cold air to the surface.

Applicants submit that Takanashi et al. is identical to what is mentioned as conventional or background art in the present specification, and that Takanashi et al. does not represent Applicants' disclosed or claimed invention, as discussed above with respect to Matsushita.

Arguably, Takanashi et al. mention supplying cold air, but the applied art only discloses that it forces cooling the melted solder below its melting temperature.

In contrast, the disclosed and claimed invention is further distinguished over Takanashi et al. by the fact that cooling air is supplied to the surface of the semiconductor part without a metal terminal formed thereon, *i.e.*, a different surface from the location of soldering. Further, temperature conditions are set so that a difference between a temperature near the metal terminal which is irradiated with the laser beam and a temperature near the surface which is supplied with cold air is maintained within a prescribed temperature range.

Specifically, the applied art does not disclose a method of soldering a semiconductor part, which includes, among other features, "...mounting a semiconductor part in which a metal terminal is formed on a back surface and a side surface on said cream solder so that only a back surface portion of said metal terminal is in contact with said cream solder; and performing solder joining of said land and said semiconductor part by irradiating a side surface portion of said metal terminal with laser beams", as recited in independent claim 1.

In addition, the applied art does not disclose a mounted structure of a semiconductor part, wherein, among other features, "...on a land of a circuit substrate, a semiconductor part having a metal terminal on a back surface and a side surface is mounted, via a cream solder printed on said land, so that almost all area of said land is opposed to a mounting surface of said semiconductor part and said land and said semiconductor part are solder jointed..., as recited in independent claim 4.

The dependent claims further distinguish over the applied art. For example, the applied art does not disclose the method of claim 2 which further includes, "...in said step of performing

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solder joining, cold air is supplied to a surface of said semiconductor part on which said metal terminal is not formed", as recited.

Accordingly, since the applied art does not disclose all the claimed features of independent claims 1 and 4, reconsideration and allowance of claims 1-4 are respectfully requested.

New Claims

New claims 5-9 have been drafted to avoid the applied art and to further define the claimed invention using alternative claim language. No new matter is involved with any new claim. Consideration and allowance of new claims 5-9 are respectfully requested.

Conclusion

In view of the above amendment, applicant believes that each of pending claims 1-9 of this application are in immediate condition for allowance. An early indication of the same would be appreciated.

In the event the Examiner believes that an interview would be helpful in resolving any outstanding issues in this case, the undersigned attorney is available at the telephone number indicated below.

Applicants believe that no fee is due with this response. However, if a fee is due, please charge CBLH Deposit Account No. 22-0185, under Order No. 22040-00034-US1 from which the undersigned is authorized to draw.

Respectfully submitted,

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